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COMMITTEE ON THE PEACEFUL USES OF
OUTER SPACE

NATIONAL RESEARCH ON SPACE DEBRIS

SAFETY OF NUCLEAR-POWERED SATELLITES

PROBLEMS OF COLLISIONS OF NUCLEAR POWER SOURCES WITH SPACE DEBRIS

Note by the Secretariat

CONTENTS

	Page
INTRODUCTION	2
REPLIES RECEIVED FROM MEMBER STATES	2
Austria	2
Pakistan	3
Sweden	4

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INTRODUCTION

1. In paragraph 24 of its resolution 47/67 of 14 December 1992, the General Assembly considered that it was essential that Member States pay more attention to the problem of collisions of space objects, including nuclear power sources, with space debris, and other aspects of space debris, and called for the continuation of national research on this question, for the development of improved technology for the monitoring of space debris and for the compilation and dissemination of data on space debris. To the extent possible, the Assembly noted, information thereon should be provided to the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space in order to allow it to follow this area more closely.

2. The General Assembly, in paragraph 25 of the same resolution, requested the Secretary-General to invite Member States to provide information on their national research on space debris to the Subcommittee.

3. The Secretary General addressed a note verbale dated 31 August 1992 to all Member States, inviting them to communicate to the Secretariat, by 1 October 1992, the information requested above so that the Secretariat could prepare a report containing this information for submission to the Subcommittee at its thirtieth session.

4. The present document was prepared by the Secretariat on the basis of information received from Member States as of 5 February 1993. Information received subsequent to that date will be included in addenda to the present document.

REPLIES RECEIVED FROM MEMBER STATES

AUSTRIA

[Original: English]

An Austrian scientist is chairing the Committee on Space Research (COSPAR) Panel on Potentially Environmentally Detrimental Activities in Space and is acting as Vice-Chairman in the European Space Agency (ESA) Advisory Group on Space Debris. A comprehensive report on the space debris problem was issued as an ESA special publication.

PAKISTAN

[Original: English]

National and international research concerning the safety of nuclear-powered satellites

At present, the Space and Research Atmosphere Research Committee (SUPARCO) is not engaged in research concerning the safety of nuclear-powered satellites but would like to share the experiences of the developed countries which are actively engaged in research in this field.

Studies conducted on the problem of the collision of nuclear-power sources with space debris

SUPARCO has undertaken a study entitled "Safety Aspects concerning the Use of Nuclear Power Sources in Space". This study is aimed at investigating the nuclear power sources (NPS) currently in use in space; devising empirical models for their possible collision with space debris and their impact on the ground; and suggesting necessary safety measures against the resulting radiation hazards. In this study the dose rate due to reactor accidents in space from the debris collision has been calculated for five reactor powers, i.e. 10KW, 50KW, 100KW, 5MW and 50MW.

The following has been done to carry out the study:

(1) A typical reactor accident resulting in a complete dispersion into the atmosphere at an altitude of 40km has been considered. The altitude was selected as a moderate value to assist the comparison of results from D. Rex, J. Bendish, W. Pfeffer and D. Bachner from Germany;

(2) Homogeneous dispersion of the radioactivity was assumed in the atmosphere;

(3) One year of continuous operation of a nuclear reactor was assumed so that the build-up of radionuclides in the reactor reached saturation. It was assumed that the reactor remained at full power during this time;

(4) Dose rates (in mSv/yr) due to the exposure from the following four sources were calculated:

- Gamma-ray activity from the settled activity on the ground;
- Gamma rays from the radioactivity in the air;
- Beta and alpha rays from the inhalation of activity;
- Beta and alpha rays from ingestion;

(5) The cumulative dose in mSv for all the above-mentioned four cases has been calculated;

(6) Steps 1 through 5 have been repeated for five powers of the nuclear reactor;

(7) Since the long-term effect comes from only the ground-deposited concentration of radioactivity, the dose rate has been compared as a function of time for various values of power. Also, a comparison of the cumulative dose for various powers has been calculated.

National research on space debris

No study has been carried out in SUPARCO in this field. However, SUPARCO would like to keep abreast with the research carried out in developed countries in this important field.

SWEDEN

[Original: English]

Space debris

Sweden does not conduct any national research on space debris, but supports the activities undertaken within ESA.